



FAA website

After a pause that seemed like forever, the tower controller voice, sounding calm, comes through the speaker. "Please give your plane number, heading and altimeter reading." Scanning the cockpit, Laura presses the mike button and reads the numbers back. Her thoughts are racing. Her throat is dry, and she summons all her wits to multitask, speaking, steering, scanning the instruments, finding the right pressure on the foot pedals which control the rudder, to keep the plane flying straight. The pilot's body spasm stops. "He's .....dead!" Laura summoned every particle of her being to focus... fly, find the best solution. She had flown with others on this route many times... but alone, at the controls, with a dead man in the seat beside her? "This plane has a full tank of gas, and if I crash, my chances of surviving are not very good. I need to fly this thing until it runs

out of gas, and then land it as gently as I can, in water. I'd better just try to head for Annapolis. That will about use up the fuel. The coast guard is more concentrated there than anywhere I know. I will follow the highways I know over the cities on the map and somehow get there. Five thousand feet. Hardly a breeze. Annapolis, here I come!

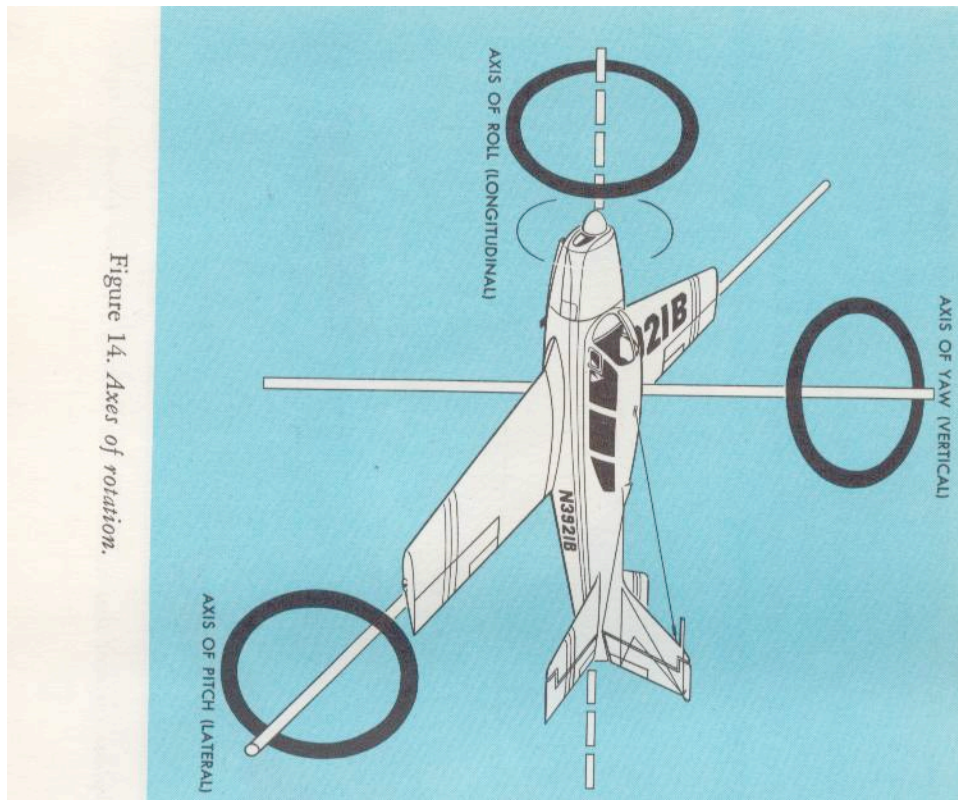


Figure 14. *Axes of rotation.*

FEDERAL AVIATION AGENCY  
**FLIGHT PLAN**

TYPE OF FLIGHT PLAN

☒ FVR  
☐ VFR  
☐ IFR  
☐ DVFR

FAA  
FORM 398

ESTIMATED  
TRUE AIR SPEED

130

DEPARTURE TIME: 8am

PROPOSED: 8:30am ACTUAL: 0800

INITIAL CRUISING ALTITUDE:

5,000

POINT OF DEPARTURE

Toronto CA

ROUTE OF FLIGHT

Buffalo NY/Altoona Pa

Chambersburg Pa/Baltimore MD

ESTIMATED TIME EN ROUTE  
HR MIN

5 HR 40 MIN

FUEL ON BOARD

HR MIN

7 30

NO. OF PERSONS ABOARD

2

CHANGES IN ALTITUDE EN ROUTE

None planned

NAME OF PILOT

COLOR OF AIRCRAFT

Terry Johnson

Silver

## GLOSSARY

**AIRFOIL:** Any surface, especially a wing or rudder, etc., designed to create a useful reaction from the air through which it moves. The useful reaction is usually lift. The Wright Brothers had to test many airfoil designs before finding one that worked well.

**AXES OF AN AIRCRAFT:** Fixed lines of reference, usually central and perpendicular to each other. An aircraft has three: the *longitudinal* (front to back) axis, the *normal* (up and down) axis, and the *lateral* (side to side) axis. The Wright Brothers knew that a true "flying machine" would **need** to be controlled in all three axes.

**COEFFICIENT:** A number that indicates the amount or quantity of a substance or material, such as air pressure. A coefficient usually becomes part of a mathematical calculation or equation.

**DRAG:** Air resistance on an airfoil or aircraft. Drag must be reduced or overcome with more lift and/or power.

**EQUATION:** A formal statement of the equality of mathematical or logical expressions. Mathematical equations will be used to calculate or figure out the reactions of motion, force, lift, drag, etc.

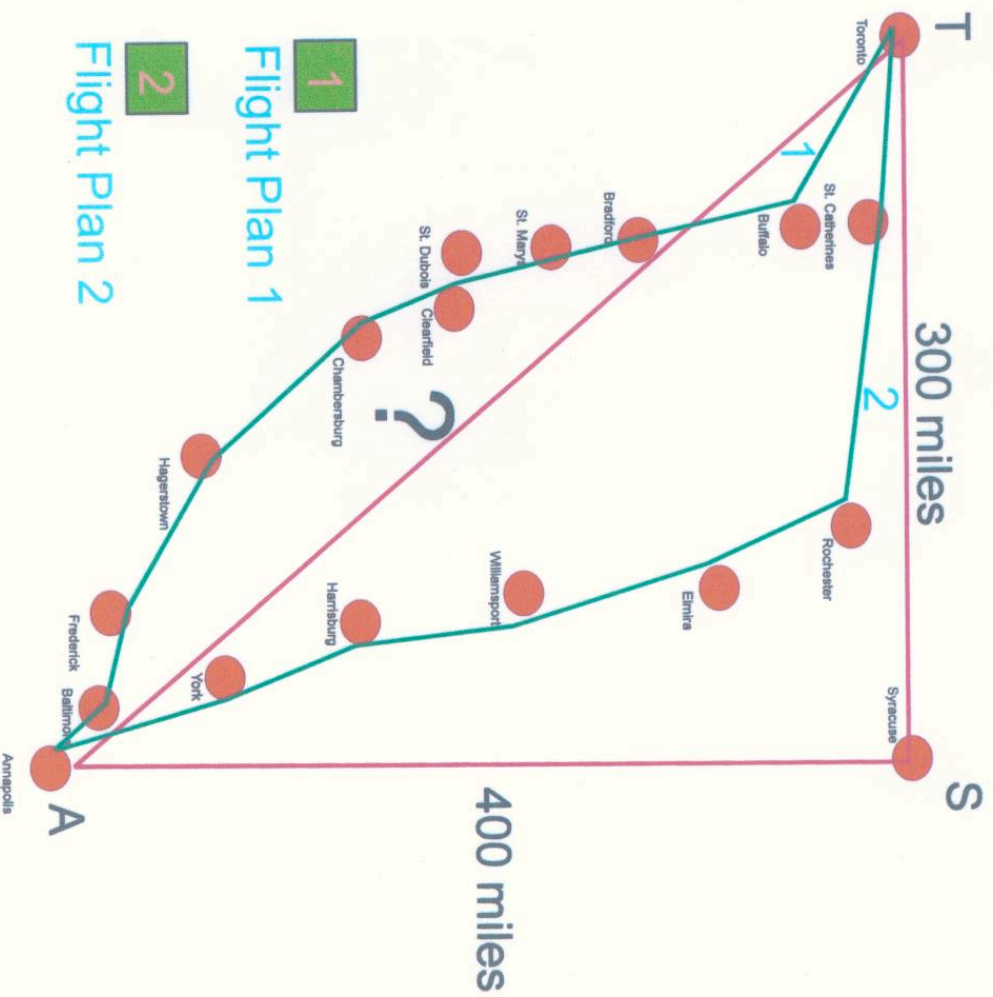
**GLIDER:** A heavier-than-air aircraft, similar to an airplane, without an engine. Testing the flight characteristics of gliders was an essential part of "learning to fly."

**LIFT:** The portion of the total force of air on an airfoil that is perpendicular to the wind. This force causes the aircraft to rise up, countering the force of gravity. The Wright Brothers developed an equation to correctly calculate lift.

**PITCH:** The motion of an aircraft when the nose rises or falls. **ROLL:** The motion of an aircraft when the wing tips rise or fall.

**THRUST:** The forward force or pull made by a propeller, which creates momentum on a column or mass of air. The movement of air over an airfoil or wing caused by thrust helps to create lift and forward motion.

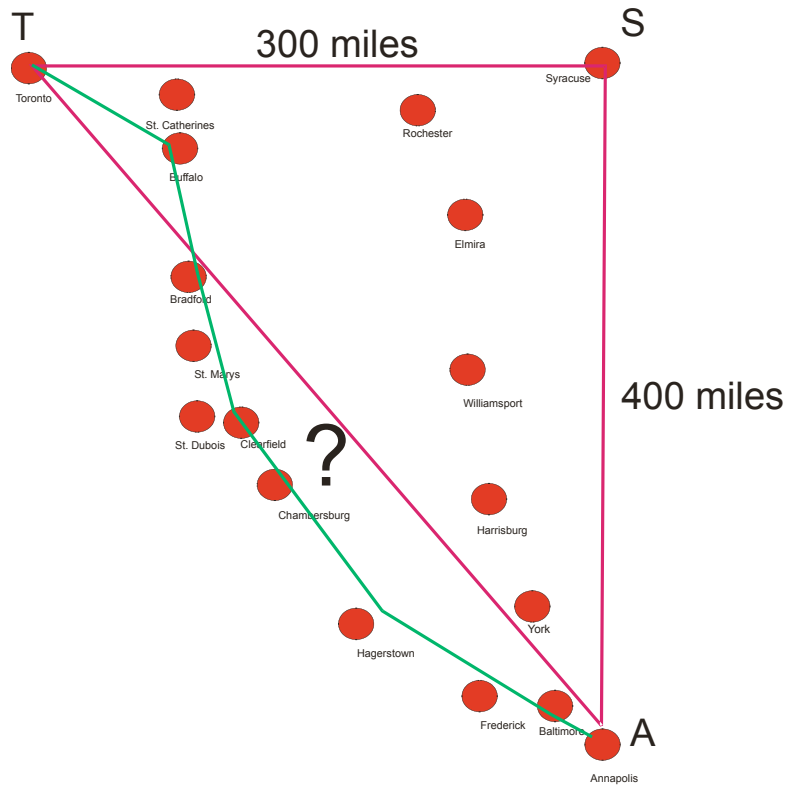
**YAW:** The angular motion of an aircraft around the vertical axis.



Solution 1: Approximate distance by air

**Pythagoras:**  
 Given a triangle with a right angle (90) degrees, the length of the hypotenuse will be equal to the square root of the sum of the squares of the other two sides.  
 Therefore, the sum of TS square plus SA square equals  $900 + 1600 = 2500$ . Take the square root of 2500. It is 500.  
 So the distance between Toronto and Annapolis, is 500 miles.





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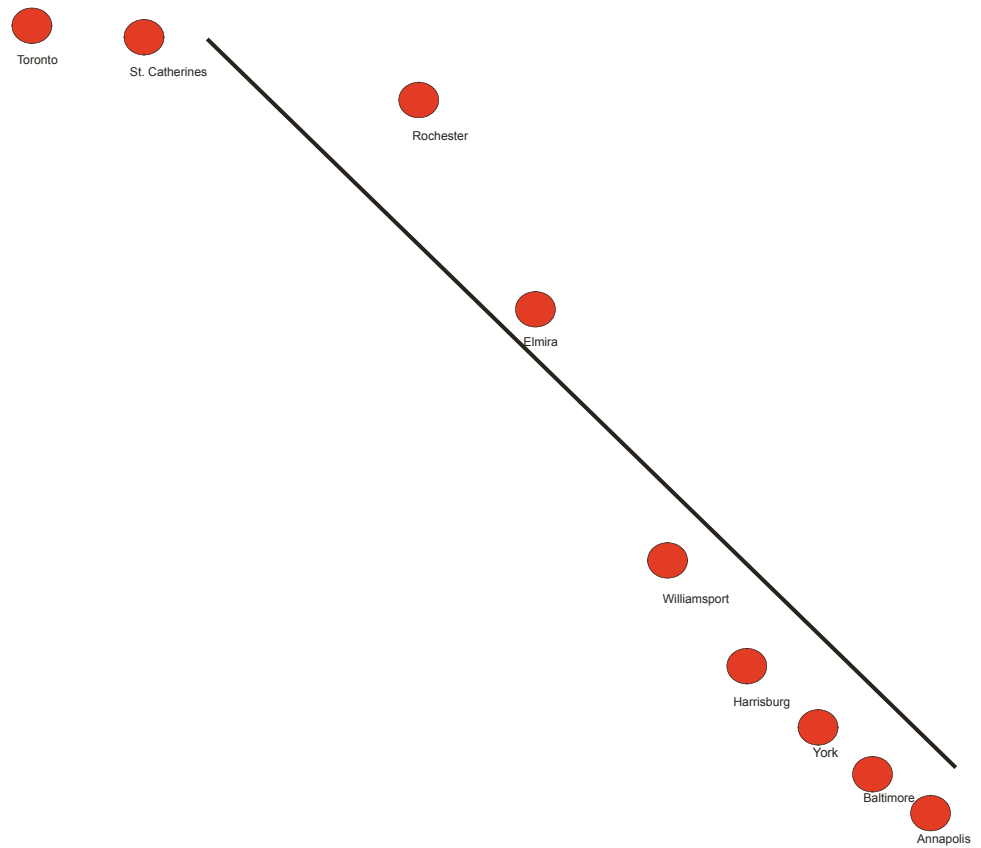
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## Scatter Plot

### Finding the line of Best Fit



Solution 2